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The Dynactome: Mapping Spatio-Temporal Dynamic Systems in Humans

Status	Current
Competition	III
Sector	Health
Genome Centre	Ontario Genomics Institute
Project Leaders	Tony Pawson, Jeff Wrana & Shawn Li

Project Description

Proteins are large molecules responsible for the structure, function and regulation of cells. Canadian-led research over the last two decades has demonstrated that proteins interact with one another, and assemble pathways and networks within cells, which account for sophisticated cellular behaviour. According to Dr. Tony Pawson, director of the Samuel Lunenfeld Research Institute at Toronto's Mount Sinai Hospital, a key to understanding diseases such as cancer lies in investigating the dynamic changes in the cell's protein interaction network.

Dr. Pawson, his colleague and fellow molecular biologist Dr. Jeff Wrana, and University of Western Ontario biochemist Shawn Li, are project leaders of the Dynactome: Mapping Spatio-Temporal Dynamic Systems in Humans.

This project will map protein interactions within human cells in order to determine whether diseases such as malignant cancers result not only from specific changes to individual genes and proteins, but also from changes in the entire cellular network. The project draws on important discoveries made by the research team.

For example, Dr. Pawson was the first to show that proteins interact in a regulated way through specific domains – something, which is important for normal cell organization but is taken over by cancer causing oncoproteins. Dr. Wrana is a world leader in understanding a super family of proteins, called Transforming Growth Factor Beta (TGF- β), which plays a major role in regulating human cell growth and function, through molecular pathways.

This project, drawing on international collaboration in the United States and China, represents the first large-scale effort to map dynamic interactions. It is expected to lead to new proteomic and computational technologies as well as innovative cancer therapies.